Enteral nutrition in ICU: small bowel or stomach? And how much?

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Nutrition therapy is considered one of the basic interventions that all patients in the intensive care unit should receive,[1] and several sets of high-quality evidence-based clinical practice guidelines recommend enteral nutrition (EN) as the mainstay of practice.[2-4] Commencement within 24 hours of ICU admission is considered beneficial,[5] but questions remain about the optimal composition, amount and delivery site.

International surveys have shown wide clinical practice variation with significant room for improvement. Some recommendations are reasonably followed, yet others are not, leading to patients receiving only about 60% of what they are intended to receive.[6] This has led to the concept that clinical outcomes might be able to be improved by using such surveys to identify higher-performing ICUs (measured by adherence to clinical practice guidelines) that can then share their practices with others.[7]

But, however well nutrition therapy is practised in the ICU, efforts to increase EN delivery are often hampered by gastrointestinal tract (GIT) dysfunction,[8] an accurate pathophysiological understanding of which is still emerging.[9] GIT dysfunction leads to EN intolerance, which has been associated with sedative and vasopressor infusions[10] and can increase the risk of hospital-acquired pneumonia.[8]

Two of the several methods by which clinicians might improve nutritional delivery are the topics of papers in this issue of the Journal. The first is the use of a nasojejunal tube (NJT) to deliver EN into the small bowel. This has been recommended in patients receiving gastric nutrition who develop elevated gastric residual volumes refractory to promotility drugs.[2,3] Other groups have recommended routine NJT placement in mechanically ventilated patients,[4] a practice that has become more feasible with developments in NJT design that allow intensive care clinicians to carry out placement at the bedside.[11,12]

The issue of routine NJT placement appears to have been settled by two recent Australian studies.[13,14] The multicentre ENTERIC study, conducted by the Australian and New Zealand Intensive Care Society Clinical Trials Group (ANZICS CTG), was specifically designed to determine whether NJT placement might be beneficial when done early in patients with mildly elevated gastric residual volumes.[13] Another single-centre study investigated routine NJT placement by bedside nurses in patients receiving mechanical ventilation.[14] Neither study was able to demonstrate clinical outcome improvements with the use of small bowel nutrition.

Importantly, this does not mean NJTs should be abandoned completely. For example, no studies have been conducted to determine whether patients with severe refractory intolerance derive a benefit from placement of an NJT. In these patients, guidelines consistently recommend that NJT feeding is preferred over supplementary parenteral nutrition.[2-4]

While NJT placement by ICU staff at the bedside has become simpler, the use of endoscopy for tube placement should not be overlooked. Although there are sometimes logistical challenges in bringing endoscopists to the ICU bedside, their placement success rates are high,[11] and endoscopy also provides upper GIT inspection for diagnostic purposes. As van Haren and colleagues have reported in this issue of the Journal, many patients who had endoscopic tube placement were found to have upper GIT abnormalities.[15] More than a third had erosions from the nasogastric tube and nearly half had one or more of gastritis, oesophagitis, gastric ulceration or duodenal ulceration. Endoscopy led to nearly 40% of patients having treatment modifications based on otherwise unrecognisable abnormalities, although whether this affected the clinical outcome could not be determined.[15]

A second method of improving nutritional delivery to the critically ill patient may be to use an energy-dense nutritional formulation. Many clinicians probably use the higher concentration EN formulations (eg, 1.5–2 kcal/ml) when patients are volume-overloaded, have oliguric renal failure, or have some other reason for volume restriction. However, it may also be that their routine use is a logical and safe way to increase energy delivery to the ICU patient. In a study conducted in conjunction with the ANZICS CTG Point Prevalence Program among 38 Australian and New Zealand ICUs, Peake and colleagues found that about half the patients who received EN on the specific study day (in 2010) received a 1 kcal/ml formulation and that the other half received a higher concentration (mostly 1.5 or 2 kcal/ml).[16]

This fairly common use of energy-dense nutritional formulations seems unexpected. It may well be that clinicians commonly believe volume restriction is necessary or that many ICUs use energy-dense formulations as routine standard care. The accuracy of single time-point snapshots must also be considered, although a well-respected research group conducted this study in a multicentre cohort.[16]

What is not well understood is whether energy-dense formulations are as well tolerated as 1 kcal/ml formulations. If they are, their routine use might reliably improve nutritional delivery. But if intolerance is frequent and perhaps greater with energy-dense formulations, the benefits of the increased energy concentration may be offset by lesser overall intake. It seems prudent to gain an understanding of this, to determine whether energy-dense formulations achieve greater nutritional delivery and improve clinical outcomes. A Phase II blinded randomised controlled trial (RCT) comparing 1 kcal/ml and 1.5 kcal/ml formulations will be commencing soon. This may progress to a large-scale multicentre RCT, as it appears from the above observations that this approach is justified by clinical equipoise.[16]

While such research is underway, it is worth considering that some recent RCT results have raised questions about the

practice of aiming to fully deliver estimated nutritional requirements,[17] particularly in the first few days in patients with acute lung injury.[18,19] These studies have found no harm in delivering less nutrition. In contrast, a large observational study showed that larger amounts of delivered nutrition were associated with improved survival[20] and a smaller single-centre RCT showed that individualised nutrition therapy based on guidance using indirect calorimetry was associated with improved nutritional delivery and patient outcomes.[21]

It therefore seems crucial for our intensive care community to gain more knowledge about the amount of energy we should deliver to our patients. The sceptics might inappropriately extrapolate recent results[17-19] to believe that optimal nutritional delivery is not important. And while it may well be that less is better in certain patient subgroups, there can be little doubt that delayed commencement of EN (ie, giving no nutritional therapy at the start of an ICU admission) is not beneficial and may be harmful.[5]

In determining the importance of giving more, giving less or giving a specific amount to specific patients, we must also consider that the effects of nutrition on outcomes such as survival may well be small. RCTs must be well designed and of adequate sample size to accurately determine whether absolute mortality differences as small as 1%–2% exist. This won't be easy and may require pragmatic and novel approaches to trial design. We also require a greater understanding of the effects of nutrition on longer-term outcomes, including physical function and quality of life measures. These may be the outcomes our patients value most.

In the meantime, we should initially deliver EN into the stomach and aim to meet standard energy targets (eg, using predictive equations or 25–30 kcal/kg/day) as well as we can. Refractory intolerance may require an NJT in some patients. The most feasible NJT placement method should be used, but clinicians should strongly consider the endoscopic NJT placement method, especially when there is a suggestion or risk of GIT disease. The optimal energy delivery target is not currently clear, but the recent increase in critical care nutrition research worldwide, including in Australia and New Zealand, gives hope that we may not be too far from knowing some of the answers.

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